

Application No.: 10/829,567
Amendment Dated: November 5, 2004
Reply to Office Action of: August 19, 2004

MAT-8183US1

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

1. (Currently Amended) An object detecting device for preventing a seizure of an object between an opening and an opening-closing unit for opening and closing said opening, said object detecting device comprising:

a pressure-sensitive sensor disposed at one of said opening and said opening-closing unit, said pressure-sensitive sensor comprising:

pressure-sensitive means for generating an output signal depending on deformation; and

support means for supporting said pressure-sensitive means at said one of said opening and said opening-closing unit, said support means including a vibration damping portion for damping vibration propagated to said pressure-sensitive means; said vibration damping portion has a hollow portion provided therein; and

judging means for judging the contact of the object with said pressure-sensitive sensor on the basis of an output signal of said pressure-sensitive sensor.

2. (Cancelled).

3. (Original) The pressure-sensitive sensor of claim 1, wherein said support means further includes a deformation amplifying portion for amplifying the deformation of said pressure-sensitive means, wherein said vibration damping portion functions also as said deformation amplifying portion.

4. (Original) The object detecting device of claim 1,

wherein said judging means includes:

a filter for extracting only a specified frequency component from the output signal of said pressure-sensitive sensor.

5. (Original) The object detecting device of claim 1, wherein said judging means calculates an integral value of the output signal of said pressure-sensitive means per unit time, and judges the contact of the object with said pressure-sensitive sensor on the basis of the integral value.

6. (Original) The object detecting device of claim 1, wherein said judging means includes an abnormality judging unit for judging abnormality of said pressure-sensitive means on the basis of the output signal of said pressure-sensitive means corresponding to vibration of said opening or said opening-closing unit.

7. (Currently Amended) An object detecting device for preventing a seizure of an object between an opening and an opening-closing unit for opening and closing said opening, an end of said opening-closing unit being arranged to contact an edge of said opening, said object detecting device comprising:

a pressure-sensitive sensor disposed at one of said opening and said opening-closing unit, said pressure-sensitive sensor comprising:

pressure-sensitive means for generating an output signal depending on deformation; and

support means for supporting said pressure-sensitive means at said one of said opening and said opening-closing unit, said support means being capable of being bent along a shape of one of said end of said opening-closing unit and said edge of said opening; and

judging means for judging the contact of the object with said pressure-sensitive sensor on the basis of an output signal of said pressure-sensitive sensor,

wherein said pressure-sensitive means has a co-axial structure including:

a central electrode;

a piezoelectric layer around said central electrode; and

an outside electrode around said piezoelectric layer; and

wherein said outside electrode includes:

a polyethylene terephthalate layer; and

an aluminum film on said polyethylene terephthalate layer.

8. (Original) The object detecting device of claim 7, wherein said one of said opening and said opening-closing unit includes a bent part, and said support means supports said pressure-sensitive means at said bent part.

9. (Cancelled).

10. (Currently Amended) The object detecting device of claim 9₇, wherein said piezoelectric layer comprises composite piezoelectric material including amorphous chlorinated polyethylene, crystalline chlorinated polyethylene, and piezoelectric ceramic powder.

11. (Cancelled).

12. (Currently Amended) The object detecting device of claim 9₇, wherein said central electrode includes:

an insulating polymer fiber; and

a metal coil wound around said insulating polymer fiber.

13. (Original) The object detecting device of claim 7, wherein said support means comprises elastic material more flexible than said pressure sensitive means.

14. (Original) The object detecting device of claim 7, wherein said support means has a hollow portion provided therein.

15. (Original) The object detecting device of claim 7, wherein said pressure-sensitive means is incorporated in said support means.

16. (Currently Amended) An object detecting device for preventing a seizure of an object ~~between-at~~ ~~an opening of a body and a slide door for opening and closing~~

said opening, said slide door having an end in a closing direction, said object detecting device comprising:

a slide door for opening and closing said opening, said slide door having an end in a closing direction, said slide door having an undulated portion for reinforcing rigidity of said slide door;

a pressure-sensitive sensor comprising:

pressure-sensitive means for generating an output signal depending on deformation; and

support means for supporting said pressure-sensitive means at or near said end one of said opening and of said slide door: and

judging means for judging the contact of the object with said pressure-sensitive sensor on the basis of an output signal of said pressure-sensitive sensor,

~~wherein said body, said opening, and said slide door have undulated portions,~~

wherein said one of said opening and end of said slide door has an end having a bent part corresponding to said undulated portion, and

wherein said support means supports said pressure-sensitive means at said bent part as to allow said support means to be bent.

17. (Currently Amended) The object detecting device of claim 16, wherein said pressure-sensitive means has a co-axial structure including:

a central electrode;

a piezoelectric layer around said central electrode; and

an outside electrode around said piezoelectric layer.

18. (Original) The object detecting device of claim 17, wherein said piezoelectric layer comprises composite piezoelectric material including amorphous chlorinated polyethylene, crystalline chlorinated polyethylene, and piezoelectric ceramic powder.

19. (Original) The object detecting device of claim 17, wherein said outside electrode includes:

a polyethylene terephthalate layer; and

an aluminum film on said polyethylene terephthalate layer.

20. (Original) The object detecting device of claim 17, wherein said central electrode includes:

an insulating polymer fiber; and

a metal coil wound around said insulating polymer fiber.

21. (Original) The object detecting device of claim 16, wherein said support means comprises elastic material more flexible than said pressure sensitive means.

22. (Original) The object detecting device of claim 16, wherein said support means has a hollow portion provided therein.

23. (Original) The object detecting device of claim 16, wherein said pressure-sensitive means is incorporated in said support means.

24. (New) An object detecting device for preventing a seizure of an object between an opening and an opening-closing unit for opening and closing said opening, said object detecting device comprising:

a pressure-sensitive sensor disposed at one of said opening and said opening-closing unit, said pressure-sensitive sensor comprising:

pressure-sensitive means for generating an output signal depending on deformation; and

support means for supporting said pressure-sensitive means at said one of said opening and said opening-closing unit, said support means including a deformation amplifying portion providing said support means with less compressibility than said pressure-sensitive means, and said deformation amplifying

portion, including a vibration damping portion for damping vibration propagated to said pressure-sensitive means, and

judging means for judging the contact of the object with said pressure-sensitive sensor on the basis of an output signal of said pressure-sensitive sensor.

25. (New) The pressure-sensitive sensor of claim 24, wherein said vibration damping portion has a hollow portion provided therein.

26. (New) The pressure-sensitive sensor of claim 24, wherein said deformation amplifying portion amplifying the deformation of said pressure-sensitive means, wherein said vibration damping portion functions also as said deformation amplifying portion.

27. (New) The object detecting device of claim 24,

wherein said judging means includes:

a filter for extracting only a specified frequency component from the output signal of said pressure-sensitive sensor.

28. (New) The object detecting device of claim 24, wherein said judging means calculates an integral value of the output signal of said pressure-sensitive means per unit time, and judges the contact of the object with said pressure-sensitive sensor on the basis of the integral value.

29. (New) The object detecting device of claim 24, wherein said judging means includes an abnormality judging unit for judging abnormality of said pressure-sensitive means on the basis of the output signal of said pressure-sensitive means corresponding to vibration of said opening or said opening-closing unit.

30. (New) An object detecting device for preventing a seizure of an object between an opening and an opening-closing unit for opening and closing said opening, an end of said opening-closing unit being arranged to contact an edge of said opening, said object detecting device comprising:

a pressure-sensitive sensor disposed at one of said opening and said opening-closing unit, said pressure-sensitive sensor comprising:

pressure-sensitive means for generating an output signal depending on deformation; and

support means for supporting said pressure-sensitive means at said one of said opening and said opening-closing unit, said support means being capable of being bent along a shape of one of said end of said opening-closing unit and said edge of said opening; and

judging means for judging the contact of the object with said pressure-sensitive sensor on the basis of an output signal of said pressure-sensitive sensor,

wherein said pressure-sensitive means has a co-axial structure including:

a central electrode;

a piezoelectric layer around said central electrode; and

an outside electrode around said piezoelectric layer; and

wherein said central electrode includes:

an insulating polymer fiber; and

a metal coil wound around said insulating polymer fiber.

31. (New) The object detecting device of claim 30, wherein said one of said opening and said opening-closing unit includes a bent part, and said support means supports said pressure-sensitive means at said bent part.

32. (New) The object detecting device of claim 30, wherein said piezoelectric layer comprises composite piezoelectric material including amorphous chlorinated polyethylene, crystalline chlorinated polyethylene, and piezoelectric ceramic powder.

33. (New) The object detecting device of claim 30, wherein said support means comprises elastic material more flexible than said pressure sensitive means.

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34. (New) The object detecting device of claim 30, wherein said support means has a hollow portion provided therein.

35. (New) The object detecting device of claim 30, wherein said pressure-sensitive means is incorporated in said support means.